

## WHAT IS CLAIMED IS:

1. A plasma etching apparatus for etching of a sample comprising:

an etching chamber, the sample being disposed in said etching chamber; and

a plasma generator which generates a plasma for performing etching of said sample in said etching chamber;

wherein said plasma generator includes an antenna disposed above the sample for radiating electromagnetic waves toward an interior of said etching chamber, a dielectric member disposed with respect to an outer periphery of said antenna, and a member disposed above the sample in the processing chamber and facing the sample at the outer periphery of said antenna, the sample being processed while enabling control of a temperature on a surface of said member.

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2. A plasma etching apparatus for processing a sample disposed inside of a processing chamber by generating a plasma in the processing chamber comprising an antenna disposed above the sample for radiating electromagnetic waves toward the inside of the processing chamber, a dielectric member disposed with respect to an outer periphery of the antenna, and a member disposed above the sample in the processing chamber and facing the sample at the outer periphery of the antenna, wherein the sample is processed while enabling control of a temperature on a surface of the member.

3. A plasma etching apparatus for processing a sample disposed inside of a processing chamber by generating a plasma in the processing chamber comprising an antenna disposed above the sample for radiating electromagnetic waves toward the inside of the processing chamber, a dielectric member disposed with respect to an outer periphery of the antenna, and a member disposed below the dielectric member and facing an interior of the processing chamber, wherein the sample is processed while enabling control of a temperature on a surface of the member.

4. A plasma etching apparatus according to claim 2, wherein the electromagnetic waves are supplied by way of the dielectric member to the inside of the processing chamber.

5. A plasma etching apparatus according to claim 2, wherein the surface of the member is heated.

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6. A plasma etching apparatus according to claim 5, further comprising a heating device for heating the surface of the member.

7. A plasma etching apparatus according to claim 6, wherein the heating device is disposed outside of the processing chamber.

8. A plasma etching apparatus according to claim 2, wherein a portion of an electric power supplied to the antenna is supplied to the member.

9. A plasma etching apparatus according to claim 2, wherein the dielectric member and the member are ring-shaped.

10. A plasma etching apparatus according to claim 3, wherein the electromagnetic waves are supplied by way of the dielectric member to the inside of the processing chamber.

11. A plasma etching apparatus according to claim 3, wherein the surface of the member is heated.

12. A plasma etching apparatus according to claim 11, further comprising a heating device for heating the surface of the member.

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13. A plasma etching apparatus according to claim 12, wherein the heating device is disposed outside of the processing chamber.

14. A plasma etching apparatus according to claim 3, wherein a portion of an electric power supplied to the antenna is supplied to the member.

15. A plasma etching apparatus according to claim 3, wherein the dielectric member and the member are ring-shaped.